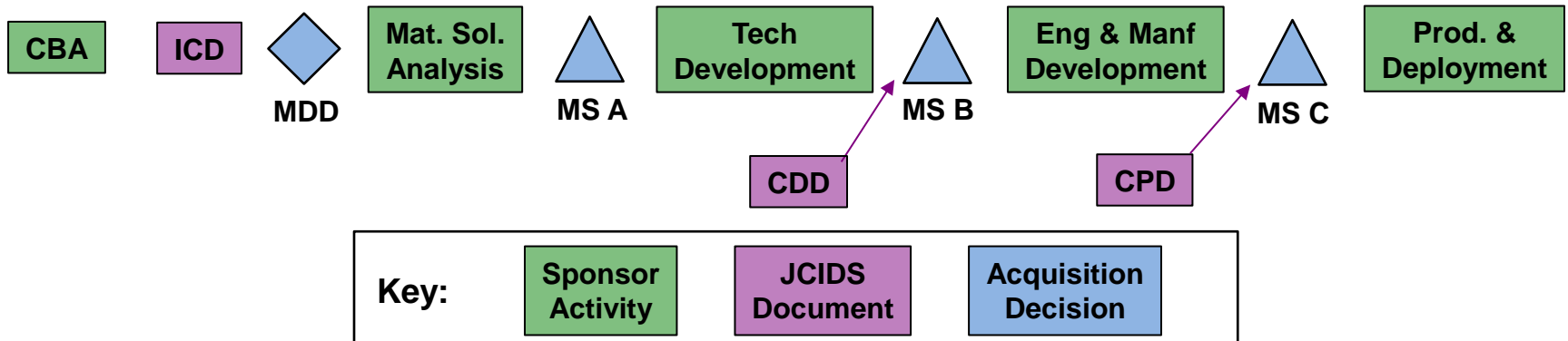
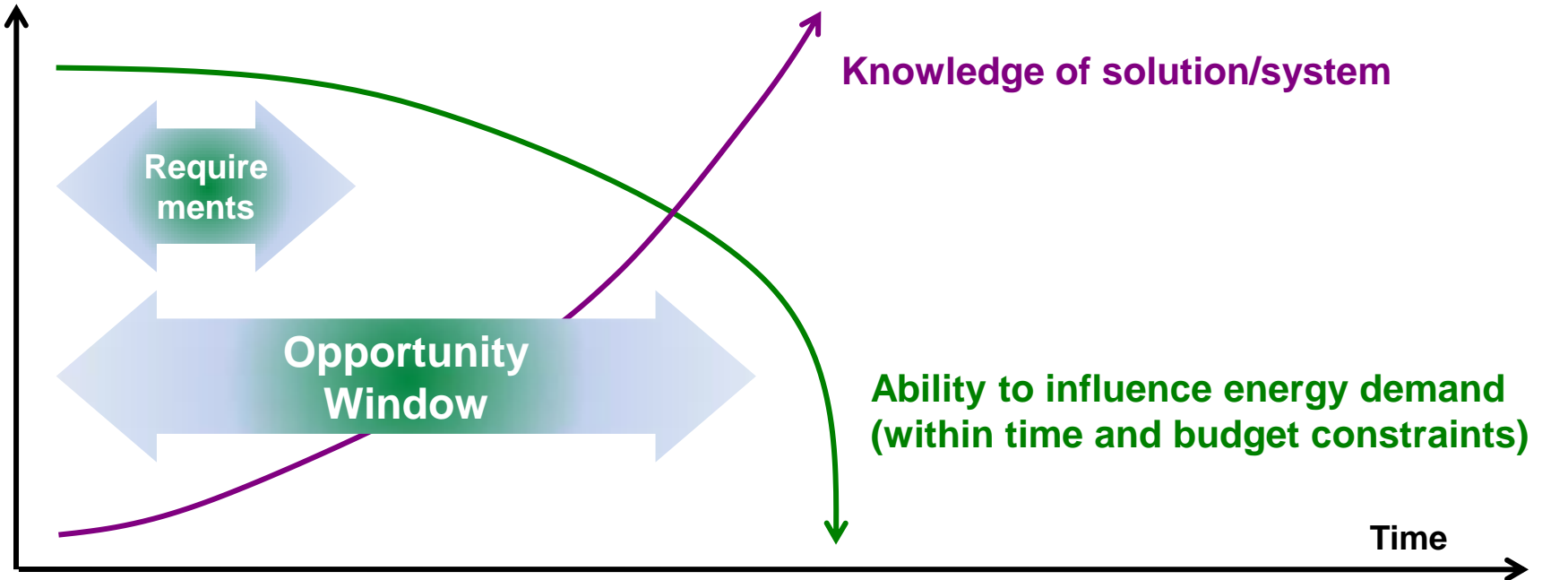




Requirements Process Controls Most of the Energy Demand & Energy Vulnerability

Knowledge / Influence





Energy KPP

- ☐ **Factors that affect energy demand**
- ☐ **Intent and purpose of the Energy KPP**
- ☐ **Characteristics of the Energy KPP**
- ☐ **Two-part process**
 - Operationally-based
 - Scenario-driven
 - Force structure-constrained
 - Considers energy demand beyond the single system/platform
- ☐ **Getting to a deterministic KPP**



Factors that affect energy demand

❑ Platform level

- Weight!
- Engine & powertrain efficiency
- Drag/resistance
- Electric power demand
- Other missions/loads using the platform

❑ Unit or force level

- Number of platforms needed per mission
- How often platforms can be cycled (e.g., sortie generation)
- Alternative combinations of force structure (*integration*)

JROC directs management of the entire trade space. Operational Energy crosscuts many other performance characteristics.



Intent and Purpose of the Energy KPP

- ☐ **“The intent of the Energy KPP is to optimize fuel and electric power demand in capability solutions as it directly affects the burden on the force to provide and protect critical energy supplies.”**
 - **JCIDS Manual dated 19 January 2012, pg B-A-3**

- ☐ **“The purpose of the Energy KPP is to address growing threats against the provisioning of energy to systems (forces) during operations while sustaining the capabilities required by the operational commander.”**
 - **JCIDS Manual dated 19 January 2012, pg B-H-2**



Characteristics of the Energy KPP

☐ Operationally-based

- Need to assess the Energy KPP and potential trade space from *an operational point of view*, not logistical

☐ Scenario-driven

- Use current (or projected) Service CONOPS/TTP to look at energy use in an operational environment – operational & tactical log support cannot be assumed away

☐ Force structure constrained

- Access to fuel is NOT unlimited NOR unfettered

☐ Considers energy demand beyond the single system/platform

- How the system/platform is employed (unit of maneuver vice single system/platform), refueled/resupplied and force structure required secure fuel/supply in the battlespace



Operationally-based

- ☐ **Need to assess the Energy KPP and potential trade space from *an operational point of view*, not a logistical point of view**
- ☐ **Applies to most FCBs**



Scenario-driven

- ☐ **Look at energy use in an operational environment – operational & tactical log support cannot be assumed away**
- ☐ **Scenario duration must be long enough to depict at least one refueling event – preferably more**
 - Consider how the threat is evolving and how RED chooses to engage – use the Joint Country Force Assessment but also play RED “smart”
- ☐ **Use current (or projected) Service CONOPS/TTP**

Do this in gap analyses (CBAs), during AoAs, ICDs, and beyond



Force Structure Constrained

- ☐ **Use planned (or programmed) Service combat and support forces (assigned, attached, executed TPDFL)**
- ☐ **In addition to known BLUE combat forces constraints, the following must be considered:**
 - Available capacity to conduct refueling operations
 - Potential limiting factors
 - Terrain (chokepoints)
 - Combat forces available for security
 - RED combat force action on BLUE logistics tail
 - Attrition of refueling assets (combat and non-combat)

Access to fuel is NOT unlimited NOR unfettered



Beyond Single System/Platform

- ☐ **Need to consider within Service CONOPS/TTP:**
 - How the system/platform is employed (unit of maneuver vice single system/platform)
 - How the unit of maneuver is refueled/resupplied in Phases I-III (not just the single system/platform)
 - How fuel is moved/stored/secured on the battlespace
- ☐ **Result is how operating and refueling the system impacts the other operational systems, the support forces, and mission accomplishment**



Two-part process

1. Start with operational macro analysis (per JCIDS manual)

- What is reasonable energy demand for the platform given the capacity of the supply chain
 - Gal/day (or volume/time) — accounts for moving and idle power demands
 - Tankings or refuelings/day — frequency and scale of fuel logistics commitment to operate

2. Then derive technical micro metrics (examples)

- Maximum electrical draw can not exceed xxx kilowatts per hour *given gal/day (operational/tactical) constraints*
- Vehicle must move xxx ton(s) of cargo yyy miles on zzz gallon(s) of fuel (ton-miles per gallon) *given gal/day constraints*
- Aircraft must have a range of xxx nm on 1 tank of fuel *given gal/day constraints*

An iterative approach to defining the solution tradespace



Getting to a deterministic KPP

- ☐ **Service performs macro analysis early in requirements process considering:**
 - CONOPS and OMS/MP
 - Refueling assets (force structure) and capacity
 - Frequency of refueling and % assets needed at one time
 - Convoy distances (doctrine) and estimated travel times
 - RED action on BLUE logistics
 - Attrition of refueling assets
 - Security for refueling assets
- ☐ **Service allocates a portion of the fuel-delivering capacity to the weapon system**
- ☐ **Program develops technical performance metrics**
 - May be multi-dimensional

Program offices must engage Service early to get macro analysis accomplished